

Bell's Vireo (*Vireo bellii*) Species Guidance

Family: Vireonidae – the vireos

State Status: [Threatened](#) (1989)

State Rank: [S2B](#)

Federal Status: [None](#)

Global Rank: [G5](#)

Wildlife Action Plan

Mean Risk Score: [4](#)

Wildlife Action Plan Area of

Importance Score: [2](#)



Counties with documented locations of Bell's Vireo breeding or breeding evidence in Wisconsin.

Source: Natural Heritage Inventory Database, December 2012.



Photo by Brian Collins

Species Information

General Description: The Bell's Vireo is a small (12 cm; 4.75 in) songbird with short, rounded wings and a short, stout bill. Sexes are similar. The head is gray with white eye rings that are broken in the front and back of the eye. The upperparts are grayish to olive-colored, the chin and throat are whitish, and the underparts (mostly flanks) have a yellowish wash. The wings are grayish-brown with two wing bars, and the lower wing bar is prominent whereas the upper one is pale to almost invisible. The song is a jumbled series of husky notes, described as “cheedle-cheedle-cheedle-chee? cheedle-cheedle-cheedle-chew!” often with a rising inflection on the first phrase and a descending inflection on the second phrase (Peterson 1980). The call is a nasal scolding “sheh-sheh” or “chee-chee” (Brown 1993, Howell and Webb 1995, Sibley 2000). An example of a typical song can be heard here:

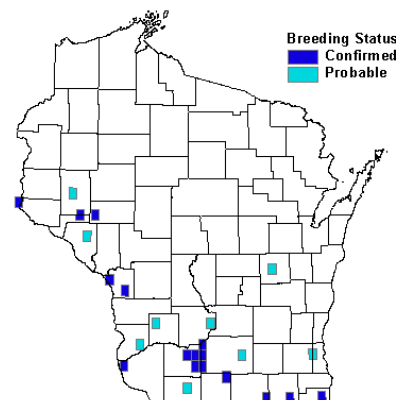
http://www.allaboutbirds.org/guide/Bells_Vireo/id

Definitive Identification: The Bell's Vireo is the only vireo in Wisconsin with a single prominent white wing bar. It also has a distinctive habit of raising and pumping its tail like a Palm Warbler (Sibley 2000). The species' distinctive song can also be used for identification by knowledgeable observers (if heard within appropriate habitat) because viewing this secretive bird can be difficult.

Similar Species: Warbling Vireos and Philadelphia Vireos lack wing bars. Bell's Vireos are distinguished from warbler species with similar plumage by their stouter, hooked bills (Brown 1993, Howell and Webb 1995). The Yellow-breasted Chat has similar habitat preferences and secretive habits but is > 50% larger than the Bell's Vireo, has a long tail, a stout bill, and a bright yellow throat and breast (Sibley 2000).

Associated Species: Within grassland habitats in Wisconsin (dry and dry-mesic prairie, wet and wet-mesic prairie, sand prairie, surrogate grassland), Bell's Vireo may occur with the following Species of Greatest Conservation Need (SGCN; WDNR 2005): Field Sparrow (*Spizella pusilla*), Grasshopper Sparrow (*Ammodramus savannarum*), Vesper Sparrow (*Pooecetes gramineus*), Henslow's Sparrow (*Ammodramus henslowii*), Lark Sparrow (*Chondestes grammacus*), Upland Sandpiper (*Bartramia longicauda*), Barn Owl (*Tyto alba*), Bobolink (*Dolichonyx oryzivorus*), Dickcissel (*Spiza americana*), Eastern Meadowlark (*Sturnella magna*), Western Meadowlark (*S. neglecta*), Dickcissel (*Spiza americana*), Brown Thrasher, Greater Prairie-chicken (*Tympanuchus cupido*), Loggerhead Shrike (*Lanius ludovicianus*), Northern Bobwhite (*Colinus virginianus*), Northern Harrier (*Circus cyaneus*), and Short-eared Owl (*Asio flammeus*). Within shrub-carr habitat, Bell's Vireo can occur with the following SGCN: American Woodcock (*Scolopax minor*), Black-billed Cuckoo (*Coccyzus erythrophthalmus*), Golden-winged Warbler (*Vermivora chrysoptera*), Veery (*Catharus fuscescens*), and Willow Flycatcher (*Empidonax traillii*).

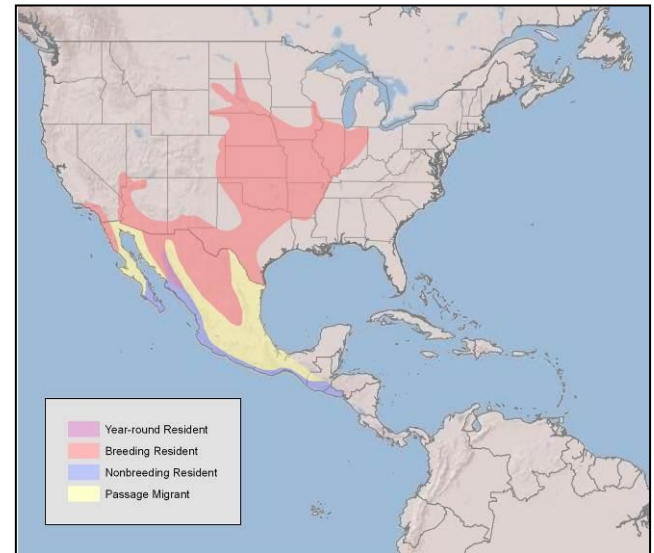
State Distribution and Abundance: Bell's Vireos are irregularly distributed as a breeding species within the state (Sauer et al. 2011). This species is uncommon in southwest and south central Wisconsin, rare or locally uncommon in western Wisconsin, and rare in the southeast and central parts of the state. It is absent in the north (north of and including the counties of Burnett, Washburn, Rusk, Clark, Marathon, Langlade, and Oconto; Door excluded).



Bell's Vireo Breeding Locations from Breeding Bird Atlas (Cutright et al. 2006)

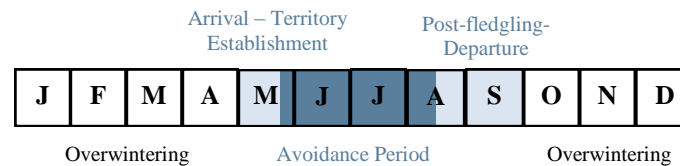
Global Distribution and Abundance: Bell's Vireos breed from parts of California, southern Nevada, southwestern Utah, northwestern and east-central Arizona, southern New Mexico, northeastern Colorado, Nebraska, South Dakota, western North Dakota, southeastern Minnesota, southern Wisconsin, northeastern Illinois, northwestern and central Indiana, and southwestern Michigan south to northern Baja California, southern Sonora, Durango, and Tamaulipas, Zacatecas, southern and eastern Texas, north-central Louisiana, Arkansas, southwestern Tennessee and Kentucky, southern Indiana, and western Ohio. They winter from southern Baja California, casually along the southern tier of states from Arizona to Florida, and southern Sonora, south to Honduras (Brown 1993). They are most abundant in Kansas/Oklahoma, southwestern Texas, and southern Arizona, with more moderate populations in states surrounding these three core areas (Sauer et al. 2011).

Diet: Bell's Vireos are invertivores, and favor insects and spiders (Araneae) (Chapin 1925). They are unique among vireos in consuming large numbers of bulky insects, especially grasshoppers (Orthoptera) and beetles (Coleoptera) (Terres 1991).



Global Range Map for Bell's Vireo (NatureServe 2013)

Reproductive Cycle: Bell's Vireos arrive in Wisconsin between early May and early June (Robbins 1991). In Wisconsin, dates for nests with eggs range from May 28 to July 14 (Robbins 1991). Bell's Vireos complete their pre-basic molt on the breeding grounds and thus can be present in Wisconsin until late September (Robbins 1991).



Ecology: Bell's Vireos forage primarily in dense brush, although they may also glean invertebrates from treetops (Terres 1991). Both male and female Bell's Vireos frequently return to the same nesting territories, particularly if they successfully fledged young there in previous years. In central Missouri, Budnik and collaborators (2000) reported 34 of 40 (85%) successful males and 14 of 27 (52%) successful females returned to breed on the same territory as the previous year. Males establish and maintain territories primarily by song, although threat displays and physical contact are also used (Brown 1993). Territory size ranges from 0.25-5.2 acres (Budnik et al. 2000, Brown 1993). Nests are usually 0.6-1.5 m (2-5 ft) high in shrubs (Robbins 1991). Prickly ash (*Zanthoxylum americanum*), American wild plum (*Prunus americana*), and American hazelnut (*Corylus americana*) appear to be favored for nests, but many species of shrubs and small trees are used. The female, sometimes with the assistance of the male, builds a tightly-woven, cup-shaped nest (Hensley 1950).

Fine strips of dried, soft plant materials such as milkweed stems (*Asclepias* spp.) and birch bark (*Betula papyrifera* or *B. nigra*) comprise the outer part of the nest, often supplemented with spider webs and cocoon material. The inner nest is lined with fine grasses, hair (of both plants and animals), and feathers (Hensley 1950, Terres 1991).

Bell's Vireos occur in uplands as well as wet or riparian areas (e.g., along streams, near swales, or in brushy draws and shallow ravines). If shrub content is adequate (5-30%), Bell's Vireos may be found in pastures, idle grasslands, old fields, native prairies, oak savanna, sedge meadows (Sample and Mossman 1997), and powerline corridors (Knutson et al. 2001). Bell's Vireos are absent from intensively cultivated areas, forests, and pure grasslands (Brown 1993).

Females lay three to five eggs, most commonly four (Brown 1993). Young depart the nest after 10-12 days (Baicich and Harrison 1997) and continue to be fed by the adults for up to 30 days after fledging (Brown 1993). Although Bell's Vireos are capable of raising two broods per season, nest failure caused by cowbird parasitism and predation greatly reduces the potential for a second brood (Brown 1993, Budnik 1999). This species can be loosely colonial in sites with abundant appropriate habitat.

Natural Community Associations ([WDNR 2005](#), [WDNR 2009a](#)):

Significant: none

Moderate: dry prairie, dry-mesic prairie, sand prairie, shrub-carr, surrogate grassland, wet prairie, wet-mesic prairie

Minimal: none

Habitat: Bell's Vireos generally occur in grassland habitats with some component of shrubs and small trees, often in scattered thickets or hedgerows. These can include uplands as well as wet or riparian areas (e.g., along streams, near swales, or in draws and shallow ravines). If adequate shrub content is present (5-30%), Bell's Vireos also may be found in pastures, idle grasslands, old fields, native prairies, oak savanna, sedge meadows (Sample and Mossman 1997), powerline corridors (Knutson et al. 2001) and other linear corridors (e.g., bike trails, railroad rights-of-way), and brushy edges to woodlots (D. Sample pers. comm.). Bell's Vireos are absent from intensively cultivated areas, forests, and entirely open grasslands (Brown 1993).

In Wisconsin, Bell's Vireos nest in brushy edges, hedgerows, and thickets within or adjacent to open habitats, especially grasslands and wetlands. Vegetation cover should be dense below a height of about 2.7 m (9 ft), with a few shrubs or saplings greater than five meters (15 ft) tall available for singing perches. Shrubs or saplings must have a spreading form with low branches. Grasses, other herbaceous vegetation, brambles, or lianas that arch over the lowest branches may offer additional nest concealment, but are not required.

Although the habitat preferences of Bell's Vireos are rather narrowly defined, they lack a significant association with any particular natural communities as defined in Wisconsin's Wildlife Action Plan (WDNR 2005). This probably stems from the fact that this bird is more sensitive to habitat structure than to plant community composition. The Wisconsin Bird Conservation Initiative All-Bird Conservation Plan provides a cross-walk from a key habitat type termed "Grassland-Shrub" to the following WDNR community types: dry prairie, dry-mesic prairie, mesic prairie, wet-mesic prairie, wet prairie, and surrogate grasslands containing greater than five percent shrub cover.



A Bell's Vireo nest (arrow) lies hidden within a dense prickly ash thicket (right). The thicket is situated within an actively grazed pasture (above). John Dadisman, Wisconsin DNR.

Threats: Major threats to Bell's Vireo stem from alteration or destruction of their habitat, which is most often associated with rural development, intensification of agriculture (including grazing), loss of grasslands, reservoir construction, removal of shrubby vegetation from agricultural fields, transportation corridors (Kirk 2006), and possibly from power line corridors. Succession of grasslands with scattered shrubs to dense shrublands and forests renders habitat unavailable. Parasitism from Brown-headed Cowbirds (*Molothrus ater*) is also a major concern because it causes nest abandonment and reduces overall nest productivity (Brown 1993, Budnik et al. 2002).

Bell's Vireos may nest in thickets with an 'understory' of non-native invasive shrubs. Studies on the impacts of non-native invasive shrubs on grassland birds are currently lacking. Research on the impact of invasive shrubs on forest-nesting birds is available, although its applicability to birds in other habitat types remains to be determined. For example, nest predation for songbirds was higher in forested settings when nests were placed in non-native invasive shrubs (Borgmann and Rodewald 2004, Schmidt and Whelan 1999), and nest success rates and habitat usage of American Woodcock decreased significantly in response to the presence of non-native invasive shrubs (Miller and Jordan 2011). Other studies have shown that birds may actually benefit from non-native invasive shrubs (e.g., increased food sources for generalist frugivores and omnivores [Reichard et al. 2001] and protection from rodent predation [Schmidt et al. 2005]). These benefits can only be enjoyed during the early stages of invasion, however, because non-native invasive shrubs eventually will dramatically modify natural community composition and structure by outcompeting native plants,

altering nutrient cycling and soil chemistry, and sometimes even facilitating invasion of non-native earthworms. These modifications incur a cascade of impacts, including alteration of avian habitat structure and food sources (Reichard et al. 2001, Schmidt et al. 2005).

Climate Change Impacts: Although climate change models have not been applied specifically to Bell's Vireo, one may infer possible impacts based on predicted changes in food sources and extreme rain events. Unseasonably warm temperatures in early spring may result in earlier insect emergence (WICCI 2011) which, if mistimed with the arrival of Bell's Vireos on their breeding territories, may present challenges for these birds to find sufficient food. An increase in the intensity and frequency of rain events as a result of climate change can necessitate large water releases from dams and reservoirs in April-June; the ensuing inundation of low-lying vireo nests in downstream areas could cause nest loss and egg/nestling mortality (WDNR 2009a). Grasslands are more likely to tolerate the increased periods and intensity of drought that are projected under climate change (Craine et al. *in press*), so Bell's Vireo populations may not be affected by climate-driven habitat shifts or alteration. In 2011, the Wisconsin Initiative on Climate Change Impacts (WICCI) Wildlife Working Group convened a workshop with bird experts from the University of Wisconsin, Wisconsin DNR, US Geological Survey, and the Western Great Lakes Bird and Bat Observatory to promote understanding of climate sensitivity for Wisconsin's birds and to categorize species into management-priority categories. The Working Group placed Bell's Vireo in the "Hold Action" category, indicating that this species is likely not sensitive to climate change impacts.

Survey Guidelines: Persons handling Bell's Vireos must possess a valid [Endangered and Threatened Species Permit](#). If surveys are being conducted for regulatory purposes, survey protocols and surveyor qualifications must first be approved by the Endangered Resources Review Program (see *Contact Information*). Area searches are an effective technique for surveying Bell's Vireos. Conduct surveys during the part of the breeding season when the species is most detectable: June 1-July 4. Carry out three surveys before initiating any project activities, preferably ten days apart, including at least one survey less than one week prior to proposed project activity if proposed activity will occur on or before July 11. Begin surveys within 15 minutes of sunrise and complete them within 4 hours, or no later than 10 am. Conduct surveys during appropriate weather (i.e., no fog, rain, or wind > 10 mph; Ralph et al. 1993).

Survey the entire affected area which contains suitable nesting habitat for Bell's Vireo. Walk slowly throughout the area, stopping occasionally to inspect all potential nesting trees and shrubs, and record the following data: all Bell's Vireos seen or heard, numbers of pairs and juveniles, and behavioral observations such as courtship displays or food carries. Whenever possible, also map the approximate territory boundaries.

Summarize results, including survey dates, times, weather conditions, number of detections, detection locations, and behavioral data and submit via the WDNR online report: <<http://dnr.wi.gov>, keyword "rare animal field report form">.

Management Guidelines

The following guidelines typically describe actions that will help maintain or enhance habitat for the species. These actions are not mandatory unless required by a permit, authorization or approval.

Bell's Vireo conservation in Wisconsin requires open habitats with scattered thickets or hedgerows. These open habitats can include uplands as well as wet or riparian areas (e.g., along streams, near swales, or in draws and shallow ravines). If adequate shrub content is present, Bell's Vireos also may be found in pastures, idle grasslands, old fields, native prairies, oak savanna, and sedge meadows (Sample and Mossman 1997), as well as powerline corridors (Knutson et al. 2001). Conduct surveys for Bell's Vireos before starting management actions to identify the most appropriate brushy areas to retain within an open landscape.

For Bell's Vireo and other shrubland birds such as Loggerhead Shrike (*Lanius ludovicianus*), retain scattered shrubs and thickets in an otherwise open landscape. While the ideal amount of shrub cover is not known, it should not exceed 30% cover, and 5% to 10% cover or less can be adequate (Sample and Mossman 1997, D. Sample pers. comm.). Suitable nest site habitat has the following components: 1) Nest thicket should be dense below a height of about 2.7 m (9 ft); 2) Nest thicket should have a spreading form with low branches; 3) Grasses, other herbaceous vegetation, brambles, or lianas that arch over the lowest branches may offer additional nest concealment, but are not required; and 4) A few low-stature trees should be available for singing perches.

Attributes of the shrub patch and surrounding landscape within which a Bell's Vireo nest lies influence the probability of nest predation and Brown-headed Cowbird parasitism (Budnik et al. 2002). To limit these deleterious impacts, provide numerous large shrub patches (> 200 m² [2,152 ft²]) scattered throughout a grassland landscape; this approach may foil predator and cowbird attempts to find the nests and will offer alternate nest sites should predation occur (Martin and Roper 1988, Budnik 1999). In southwestern Wisconsin, Sample (pers. comm.) suggests leaving shrub patches that are at least 100 m² (1,076 ft²) in area and 15 m (49 ft) apart; these design guidelines have been applied, along with monitoring for Bell's Vireo breeding success, by The Prairie Enthusiasts as part of their prairie remnant management. Retain a few low-stature trees (> 3 m [10 ft] tall) to provide important singing perches for male Bell's Vireos as they establish and defend their territories. Keep these singing perches separate from the nest thicket, however, because Brown-headed Cowbird parasitism is higher with perches near nests, especially perches that are shorter (Budnik et al. 2002).

Shrub communities typically lack long-term stability, mostly due to natural succession as the cooler moister microclimate created by the shrubs encourages invasion of trees. Prescribed burning is effective for maintaining an open graminoid-dominated landscape matrix, but may compromise the integrity of brushy vireo habitat. Implement a combined management approach by protecting target brushy areas for Bell's Vireos while maintaining the surrounding open landscape with prescribed fire, grazing, or mowing ([Wisconsin Bird Conservation Initiative All-Bird Conservation Plan](#)). To limit labor-intensive protection of target brushy areas, retain those shrub communities that occur in naturally cool and moist microsites through which fire will not effectively run (ravines, draws, and other low topographic sites); this will allow managers to apply prescribed fire to the surrounding open landscape without risking damage to Bell's Vireo habitat. Periodically cull tall trees (> 3 m [10 ft]) invading these areas as needed. Light to moderate grazing may also be an effective way to maintain open grassland areas without eliminating shrub communities (Sample and Mossman 1997). For guidelines on avoiding negative impacts to Bell's Vireo during the course of management activities, refer to the WDNR Protocol for Incidental Take Authorization for Bell's Vireo (WDNR 2011).

The priority region for Bell's Vireo conservation in Wisconsin lies in Iowa, western Dane, Lafayette and Green counties within the [southwest savanna](#) ecological landscape; this represents the probable population core for the state ([Wisconsin Bird Conservation Initiative All-Bird Conservation Plan](#)). Other priority landscapes for Bell's Vireo conservation include Mississippi River sand terraces (and associated river tributaries) of La Crosse and Trempealeau counties (A. Bartz pers. comm.) and the Lower Chippewa River in Dunn County. The actual relationship of Bell's Vireo abundance to size of grassland, number of shrub patches, and other landscape variables remains an important research question. Regardless of whether Bell's Vireo conservation occurs at a landscape or local level, general habitat enhancement initiatives may include preservation of shrubby vegetation along roadsides, fences, recreational trails, and powerlines, brushy revegetation of riparian corridors, and retention of thickets in natural/grassland habitats (WDNR 2005).

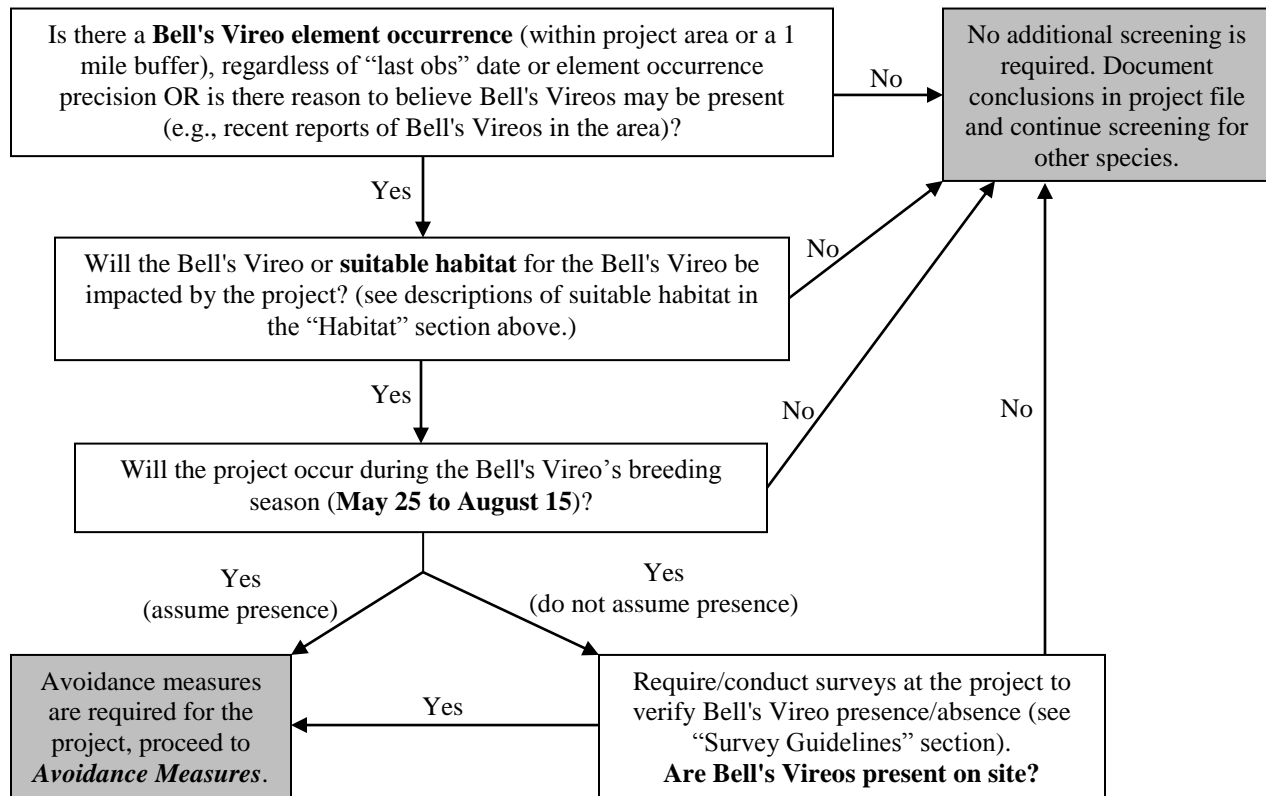


This privately-owned pasture in Iowa County, Wisconsin harbors a mix of remnant dry prairie and old field with varying amounts of trees and shrubs. Dense thickets of prickly ash, gray dogwood and wild plum support multiple nesting pairs of Bell's Vireo. The landowners have cleared limited areas of trees and brush with the help of WDNR, U.S. Fish and Wildlife Service, and The Prairie Enthusiasts to: 1) restore habitat for rare prairie species; 2) retain viable Bell's vireo habitat; and 3) maintain a viable dairy operation. John Dadisman, Wisconsin DNR

Screening Procedures

The following procedures must be followed by DNR staff reviewing proposed projects for potential impacts to the species.

Follow the “Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff” document (summarized below) to determine if Bell’s Vireo will be impacted by a project (WDNR 2012):



Avoidance Measures

The following measures are specific actions required by DNR to avoid take (mortality) of state threatened or endangered species per Wisconsin's Endangered Species law (s. 29.604, Wis. Stats.) These guidelines are typically not mandatory for non-listed species (e.g., special concern species) unless required by a permit, authorization or approval.

Bell's Vireos are protected by the Federal Migratory Bird Treaty Act of 1918, which established a prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, included in the terms of this Convention . . . for the protection of migratory birds . . . or any part, nest, or egg of any such bird." (16 U.S.C. 703). Contact the US Fish and Wildlife Service directly for any permits related to the Federal Migratory Bird Treaty Act (see Contact Information).

According to Wisconsin's Endangered Species Law (s. 29.604, Wis. Stats.), it is illegal to take, transport, possess, process, or sell any wild animal on the Wisconsin Endangered and Threatened Species List (ch. NR 27, Wis. Admin. Code). Take of an animal is defined as shooting, shooting at, pursuing, hunting, catching or killing.

If *Screening Procedures* above indicate that avoidance measures are required for a project, follow the measures below. If you have not yet read through *Screening Procedures*, please review them first to determine if avoidance measures are necessary for the project.

1. The simplest and preferred method to avoid take of Bell's Vireos is to avoid directly impacting individuals, known Bell's Vireo locations, or areas of suitable habitat (described above in the “Habitat” section and in *Screening Procedures*).

2. If Bell's Vireo impacts cannot be avoided entirely, avoid impacts during the **breeding season (May 25 through August 15)**.
3. If Bell's Vireo impacts cannot be avoided, please contact the Natural Heritage Conservation Incidental Take Coordinator (see *Contact Information*) to discuss possible project-specific avoidance measures. If take cannot be avoided, an [Incidental Take Permit or Authorization](#) is necessary. (Any restoration project or management activity that follows the Grassland and Savanna Protocols for this species [<http://dnr.wi.gov/topic/erreview/Documents/GspBellsVireo2011.pdf>], is covered for any unintentional take that may occur, provided that the required [Incidental Take Permit or Authorization](#) is issued.)

Additional Information

References

- Baichich, P.J., and C.J.O. Harrison. 1997. *A Guide to the Nests, Eggs, and Nestlings of North American Birds*, Second Edition. Academic Press. San Diego, CA.
- Borgman, K.L. and A.D. Rodewald. 2004. Nest predation in an urbanizing landscape: The role of exotic shrubs. *Ecological Applications* 14(6): 1757-1765.
- Brown, Bryan T. 1993. Bell's Vireo (*Vireo bellii*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <<http://bna.birds.cornell.edu/bna/species/035doi:10.2173/bna.35>> (accessed January 4, 2013).
- Budnik, J.M. 1999. Demography and factors influencing nesting success of Bell's vireos in grassland-shrub habitats. Thesis, University of Missouri-Columbia, USA.
- Budnik, J.M., M.R. Ryan, and F.R. Thompson, III. 2000. Demography of Bell's Vireos in Missouri grassland-shrub habitat. *The Auk* 117(4):925-935.
- Budnik, J.M., F.R. Thompson, III, and M.R. Ryan. 2002. Effect of habitat characteristics on the probability of parasitism and predation on Bell's Vireo nests. *Journal of Wildlife Management* 66(1):232-239.
- Chapin, E.A. 1925. Food habits of the vireos. U.S.D.A. Agricultural Bulletin No. 1355, 42pp.
- Craine, J.M., T.W. Ocheltree, J.B. Nippert, E.G. Towne, A.M. Skibbe, S.W. Kembel, and J.E. Fargione. *in press*. Global diversity of drought tolerance and grassland climate-change resilience. *Nature Climate Change*.
- Hensley, M.M. 1950. Notes on the breeding behavior of the Bell's Vireo. *The Auk* 67(2):243-244.
- Howell, S.N.G., and S. Webb. 1995. *A Guide to the Birds of Mexico and Northern Central America*. Oxford University Press, New York.
- Kirk, K. 2006. Bell's Vireo. Pages 286-287 in N.J. Cutright, B.R. Harriman, and R.W. Howe, eds. *Atlas of the Breeding Birds of Wisconsin*. The Wisconsin Society for Ornithology, Inc., Madison, WI. 602 pp.
- Knutson, M.G., G. Butcher, J. Fitzgerald, and J. Shieldcastle. 2001. *Partners in Flight Bird Conservation Plan for The Upper Great Lakes Plain (Physiographic Area 16)*. USGS Upper Midwest Environmental Sciences Center in cooperation with Partners in Flight, La Crosse, Wisconsin.
- Martin, T.E. and J.J. Roper. 1988. Nest predation and nest-site selection of a western population of the hermit thrush. *Condor* 90:51-57.
- NatureServe. 2013. Data provided by NatureServe in collaboration with Robert Ridgely, James Zook, The Nature Conservancy - Migratory Bird Program, Conservation International - CABS, World Wildlife Fund - US, and Environment Canada - WILDSPACE. Data were accessed Jan. 2013.
- Peterson, R.T. 1980. *A Field Guide to the Birds: A Completely New Guide to All the Birds of Eastern and Central North America*. Houghton Mifflin Company, Boston. Fourth edition, 384 pp.

- Potter, B. A., G.J. Soulliere, D.N. Ewert, M.G. Knutson, W.E. Thogmartin, J.S. Castrale, and M.J. Roell. 2007. Upper Mississippi River and Great Lakes Region Joint Venture Landbird Habitat Conservation Strategy. U.S. Fish and Wildlife Service, Fort Snelling, MN. 124 pp.
- Ralph, C. J., G.R. Geupel, P. Pyle, T.E. Martin, and D.F. DeSante. 1993. Handbook of field methods for monitoring landbirds. General Technical Report PSW-GTR-144-www. Albany, CA. Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 41 pp.
- Reichard, S.H., L. Chalker-Scott, and S. Buchanan. 2001. Interactions among nonnative plants and birds. Pages 179-223 in J.M. Marzluff, R. Bowman, and R. Donnelly, eds. Avian ecology and conservation in an urbanizing world. Kluwer Academic Publishers. Boston, Mass.
- Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S.W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Inigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2004. Partners in Flight North American Landbird Conservation Plan. Cornell Lab of Ornithology. Ithaca, New York. <http://www.partnersinflight.org/cont_plan/default.htm> (accessed June 29 2009).
- Robbins, S.D., Jr. 1991. Wisconsin Birdlife: Population and distribution past and present. University of Wisconsin Press, Madison, WI.
- Schmidt, K.A. and C.J. Whelan. 1999. Effects of exotic *Lonicera* and *Rhamnus* on songbird nest predation. *Conservation Biology* 13(6): 1502-1506.
- Schmidt, K.A., L.C. Nelis, N. Briggs, and R.S. Ostfeld. 2005. Invasive shrubs and songbird nesting success: Effects of climate variability and predator abundance. *Ecological Applications* 15(1): 258-265.
- Sample, D. and M. Mossman. 1997. Managing Habitat for Grassland Birds: A Guide for Wisconsin. Wisconsin Department of Natural Resources, Madison, WI.
- Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2011. The North American Breeding Bird Survey, Results and Analysis 1966 - 2010. Version 12.07.2011. USGS Patuxent Wildlife Research Center, Laurel, MD. <<http://www.mbr-pwrc.usgs.gov/bbs/bbs.html>> (accessed December 21 2012).
- Sibley, D.A. 2000. The Sibley Guide to Birds. Alfred A. Knopf, New York.
- Terres, J. K. 1991. The Audubon Society Encyclopedia of North American birds. Wings Books, New York.
- WDNR [Wisconsin Department of Natural Resources]. 2005. Wisconsin's Strategy for Wildlife Species of Greatest Conservation Need: A State Wildlife Action Plan. Madison, WI. <<http://dnr.wi.gov>>, key word "Wildlife Action Plan" (accessed December 21, 2012).
- WDNR [Wisconsin Department of Natural Resources]. 2009a. Wisconsin wildlife action plan species profile: Bell's Vireo. (accessed November 26, 2012). Madison, Wisconsin, USA. Material now available on the Natural Heritage Conservation species Web page: <<http://dnr.wi.gov>>, key word "biodiversity" (accessed December 21, 2012).
- WDNR [Wisconsin Department of Natural Resources]. 2009b. Feasibility Study, Master Plan and Environmental Impact Statement for the Southwest Wisconsin Grassland and Stream Conservation Area. A report to the Natural Resources Board.
- WDNR [Wisconsin Department of Natural Resources]. 2011. Protocol for Incidental Take Authorization. Bell's vireo (*Vireo bellii*). <<http://dnr.wi.gov>>, key word "grassland and savanna management" (accessed February 15, 2013).
- WDNR [Wisconsin Department of Natural Resources]. 2012. Conducting Endangered Resources Reviews: A Step-by-Step Guide for Wisconsin DNR Staff. Bureau of Endangered Resources. Wisconsin Department of Natural Resources, Madison, Wisconsin.
- WDNR [Wisconsin Department of Natural Resources]. 2013. Natural Heritage Inventory database. (accessed December 15, 2012).
- WICCI [Wisconsin Initiative on Climate Change Impacts]. Wisconsin's Changing Climate: Impacts and Adaptation. 2011. Nelson Institute for Environmental Studies, University of Wisconsin-Madison and the Wisconsin Department of Natural Resources, Madison, Wisconsin. <http://www.wicci.wisc.edu/report/2011_WICCI-Report.pdf> (accessed December 21, 2012).

Linked Websites:

- Natural Communities of Wisconsin: <<http://dnr.wi.gov>, key word “natural communities”>
- Rare Animal Field Report Form: <<http://dnr.wi.gov>, key word “rare animal field report form”>
- Wisconsin Bird Conservation Initiative All-Bird Conservation Plan: <<http://www.wisconsinbirds.org/plan/species/bevi.htm>>
- Wisconsin Endangered and Threatened Species: <<http://dnr.wi.gov>, key word “endangered resources”>
- Wisconsin Endangered and Threatened Species Permit: <<http://dnr.wi.gov>, key word “endangered species permit”>
- Wisconsin Initiative on Climate Change Impacts: <<http://www.wicci.wisc.edu/>>
- Wisconsin Natural Heritage Inventory Working List Key: <<http://dnr.wi.gov>, key word “Natural Heritage Working List”>
- Wisconsin Wildlife Action Plan: <<http://dnr.wi.gov>, key word “Wildlife Action Plan”>

Funding

- Natural Resources Foundation of Wisconsin: <<http://www.wisconservation.org/>>
- USFWS State Wildlife Grants Program: <<http://wsfrprograms.fws.gov/subpages/grantprograms/swg/swg.htm>>
- Wisconsin Natural Heritage Conservation Fund
- Wisconsin DNR Division of Forestry

Contact Information (Wisconsin DNR Species Experts for Bell's Vireo)

- [Amy Staffen](#), WI Department of Natural Resources, Bureau of Natural Heritage Conservation (608-261-0747, amy.staffen@wisconsin.gov)
- [Kim Grveles](#), WI Department of Natural Resources, Bureau of Natural Heritage Conservation (608-264-8594, kim.grveles@wisconsin.gov)

Endangered Resources Review Program Contacts

- General information (608-264-6057, DNREReview@wisconsin.gov)
- [Rori Paloski](#), Incidental Take Coordinator, Wisconsin DNR, Bureau of Natural Heritage Conservation (608-264-6040, rori.paloski@wi.gov)

Contact Information (Federal Migratory Bird Treaty Permits or Questions)

- [Larry Harrison](#), U.S. Fish and Wildlife Service, 5600 American Blvd. West, Suite 990, Bloomington, MN 55437-1458 (612-713-5489, Larry_Harrison@fws.gov)
- See also <<http://www.fws.gov/migratorybirds/mbpermits.html>>

Suggested Citation

- Wisconsin Department of Natural Resources. 2013. Wisconsin Bell's Vireo Species Guidance. Bureau of Natural Heritage Conservation, Wisconsin Department of Natural Resources, Madison, Wisconsin. PUB-ER-703.

Developed by

- Kim Kreitinger and Amy Staffen, primary authors
- Gregor W. Schuurman, primary editor

Special Acknowledgment

We acknowledge the administrators of the [Wisconsin Bird Conservation Initiative All Bird Conservation Plan](#) webpage for allowing reproduction of text in several parts of this document.

Wisconsin Department of Natural Resources
Bureau of Natural Heritage Conservation
PO Box 7921
Madison, WI 53707-7921
<http://dnr.wi.gov>, keyword “ER”

